

**AD-A248 359****REPORT DOCUMENTATION PAGE**Form Approved  
OMB No. 0704-0188

Estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and maintaining records. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing burden, to: Director, Information Resources Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, Attention: Project (0704-0188), Washington, DC 20503.

		2. REPORT DATE March 1992		3. REPORT TYPE AND DATES COVERED professional paper
4. TITLE AND SUBTITLE <b>NARROW-BAND SONAR SIGNALS OF SMALL CETACEANS</b>		5. FUNDING NUMBERS PR: MMB2 PE: 0602435N WU: DN688674		
6. AUTHOR(S) W. W. L. Au		8. PERFORMING ORGANIZATION REPORT NUMBER		
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Command, Control, and Ocean Surveillance Center (NCCOSC), Research, Development, Test and Evaluation Division (NRaD) San Diego, CA 92152-5000		10. SPONSORING/MONITORING AGENCY REPORT NUMBER		
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) Naval Ocean Systems Center (now NRaD) Block Programs San Diego, CA 92152-5000		DTIC ELECTS S C D APR 7 1992		
11. SUPPLEMENTARY NOTES  Approved for public release; distribution is unlimited.		12a. DISTRIBUTION/AVAILABILITY STATEMENT  Approved for public release; distribution is unlimited.		
13. ABSTRACT (Maximum 200 words)  The sonar signals of some of the smallest cetaceans are very similar to each other and very different than that of mid-sized cetaceans. Signals of <i>Cephalorhynchus hectori</i> , <i>Cephalorhynchus commersonii</i> (genus <i>Cephalorhynchus</i> ), <i>Phocoena phocoena</i> , <i>Neophocoena phocoena</i> and <i>Phocoenoides dalli</i> (family phocoenidae) are compared with those of some larger dolphins. Signals of <i>Tursiops truncatus</i> , <i>Delphinapterus leucas</i> and <i>Pseudorca crassidens</i> , housed in Kaneohe Bay, Oahu, Hawaii, have peak frequencies between 100–200 kHz, with high amplitudes (210–225 dB re 1 µPa), short durations (50–70 µs), and wide bandwidths (30–40 kHz). Some of the smaller cetaceans emit signals having peak frequencies between 120 and 140 kHz, with low amplitudes (< 170 dB re 1 µPa), long durations (170–430 µs) and narrow bandwidths (7–11 kHz). Double pulses are also emitted regularly by some of the smaller dolphins and very infrequently by the larger dolphins. Signals used by the smaller animals may reflect constraints associated with their small size and differences in generation mechanisms. For a given peak acoustic pressure, there is 3 to 4 times more energy in the signals of the smaller cetaceans. However, because of the narrower bandwidths, the distance resolution capability of the small cetacean signals is between 2 to 3.5 times inferior to that of the larger animals. Furthermore, the narrow bandwidth signals do not possess any doppler resolution properties.		12b. DISTRIBUTION CODE		
14. SUBJECT TERMS  marine biosystems marine biology		15. NUMBER OF PAGES		
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED		18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED		
19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED		20. LIMITATION OF ABSTRACT SAME AS REPORT		

NSN 7540-01-280-5500

**92-08785****92 4 06 082**

UNCLASSIFIED

21a. NAME OF RESPONSIBLE INDIVIDUAL W. W. L. Au	21b. TELEPHONE (Include Area Code) (808) 257-1647	21c. OFFICE SYMBOL Code 512

Published in Program of Ninth Biennial Conference on the Biology of Marine Mammals, Chicago, Illinois, Dec. 5-9, 1991.

NARROW-BAND SONAR SIGNALS OF SMALL CETACEANS

Whitlow W. L. Au  
Naval Ocean Systems Center  
P.O. Box 997, Kailua, HI 96734

ABSTRACT

The sonar signals of some of the smallest cetaceans are very similar to each other and very different than that of mid-sized cetaceans. Signals of *Cephalorhynchus hectori*, *Cephalorhynchus commersonii*, (genus *Cephalorhynchus*), *Phocoena phocoena*, *Neophocoena phocoena* and *Phocoenoides dalli* (family phocoenidae) are compared with those of some larger dolphins. Signals of *Tursiops truncatus*, *Delphinapterus leucas* and *Pseudorca crassidens*, housed in Kaneohe Bay, Oahu, Hawaii, have peak frequencies between 100-120 kHz, with high amplitudes (210-225 dB re 1  $\mu$ Pa), short durations (50-70  $\mu$ s), and wide bandwidths (30-40 kHz). Some of the smaller cetaceans emit signals having peak frequencies between 120 and 140 kHz, with low amplitudes (< 170 dB re 1  $\mu$ Pa), long durations (170-430  $\mu$ s) and narrow bandwidths (7-11 kHz). Double pulses are also emitted regularly by some of the smaller dolphins and very infrequently by the larger dolphins. Signals used by the smaller animals may reflect constraints associated with their small size and differences in generation mechanisms. For a given peak acoustic pressure, there is 3 to 4 times more energy in the signals of the smaller cetaceans. However, because of the narrower bandwidths, the distance resolution capability of the small cetacean signals is between 2 to 3.5 times inferior to that of the larger animals. Furthermore, the narrow bandwidth signals do not possess any doppler resolution properties.

Distribution  
Availability  
Avail. to Non  
Dist. Spec. 1  
A-1 20